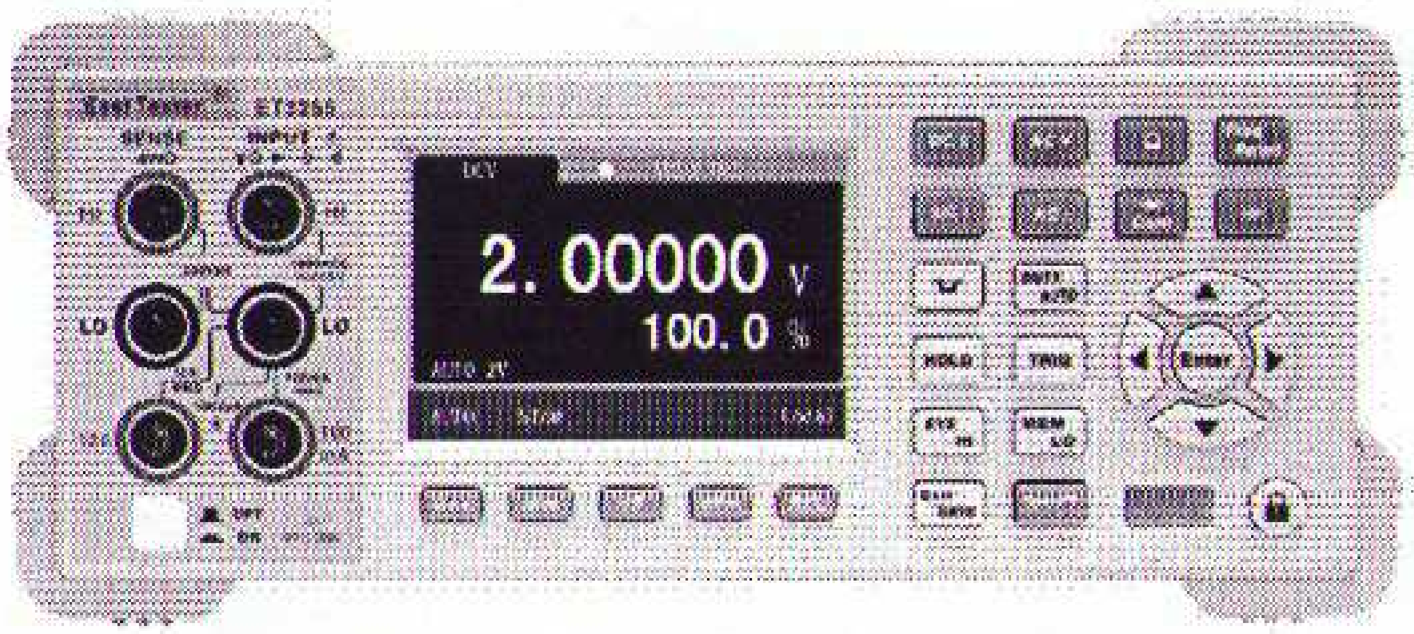
East Tester®

ET3240 4½ Benchtop Digital Multimeter

ET3255 5½ Benchtop Digital Multimeter

User's Manual



Hangzhou Zhongchuang Electronics Co., Ltd.

Table of Contents

1 Safety Precautions

To avoid personal injury and prevent damage to the instrument, be sure to use this instrument in accordance with the manual.Before fully understanding and meeting the following warning,do not proceed to the next step.

Safety ground:

Connect the power cord of the instrument to a grounded socket. Make sure that the instrument is reliably grounded.

Use proper fuse:

Please use only fuses of the specified type and rating.

Proper use of lead set:

Do not use damaged or worn test lead set. When using probes, the finger should be kept behind the finger protector of the probe. When wiring, you should connect the common line first and then connect the charged test lead. When disconnecting, disconnect the charged test lead first.

If the instrument malfunctions, do not use:

Its protection may be impaired, do not install substitute parts or conduct unauthorized adjustment of the instrument. Please return the instrument for repair or professional inspection to ensure their safety features.

Do not use this instrument at high temperature, or environment with explosives or strong electromagnetic field.

Do not change the wiring inside the instrument, so as not to cause damage to the instrument or endanger the safety.

When measuring, you must select the correct measurement function and the measurement range.

Before the function range is switched, disconnect the probe and the circuit under test to prevent damage to the instrument.

Protect limits:

Without exceeding the protection limits, the protection circuit of this instrument prevents damage to the instrument and shock hazard. To ensure the safe operation of the instrument, do not exceed the marked limits for protection on front and rear panels.

IEC measurement type II overload protection:

To avoid the risk of electric shock, this instrument provides overload protection for the mains under the following two conditions:

1) HI and LO input terminals under the condition of the measurement type II (as described below) are connected to mains.
2) The maximum line voltage of mains is 300 VAC.

In order to avoid blown fuse or damage to the meter, be sure to follow these tips to use the current input terminals.

1) 10 A and 200mA input terminals are not allowed to simultaneously connect to the current measurement circuit.
2) If the effective value of the measured current AC + DC is within the range from 200mA to 10 A, only 10A and LO terminals are allowed to be used in the measurement.
3) Before performing current measurement, be sure to select the correct current input terminal according to the expected current size.

4) The current input to the terminal 10 A must not exceed 10A; otherwise, the internal fuse inside the multimeter will blow; and the current input to 200mA terminal must not exceed 500mA; otherwise, the current input fuse on the rear panel will blow.

Warning:

IEC measurement type II includes the electrical device one of whose sockets on the branch circuit is connected to mains. Such devices include most small appliances, test equipment, and other equipment inserted into the branch socket.

The voltage higher than 300 VAC can only be measured in the circuit with the mains cut off. However, there is transient overvoltage in the circuit with the mains cut off. This instrument can withstand up to 2500 Vpk of occasional transient overvoltage safely. Do not use this instrument to measure the circuit with a transient overvoltage higher than this level.

This instrument can be used for such measurements: HI and LO inputs are connected to mains of such devices (up to 300 VAC), or to the branch outlet. However, the HI and LO inputs terminals of this instrument cannot be connected to the mains in the permanently installed electrical devices, such as the main circuit-breaker panel, sub-panel fuse boxes, or permanently wired motors. Such devices and circuits can easily exceed the limit of this instrument for overload protection.

Environment related notes:

This instrument complies with the requirements on marking under WEEE Directive (2002/96 / EC). According to the label on the instrument (see below), do not dispose the electrical / electronic equipment along with household waste together.

This instrument may contain substances that might be harmful to the environment or human health; in order to avoid the release of hazardous substances into the environment or harm to human health, we recommend the use of appropriate methods to recycle this instrument in order to ensure that most of the materials are reused or recycled. For disposal or recycling related information, please contact the local authorities.

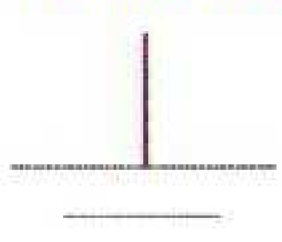


Instrument category:

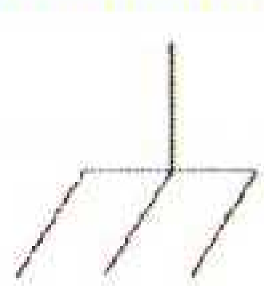
According to Appendix 1 of the WEEE Directive, the instrument is classified as a "monitored and controlled instrument".

Signs on the product:

The following signs might be seen on the instrument:



Signal ground



chassis ground



High voltage



Refer to Manual

Limited warranty and liability.

The company is responsible for free repair or replacement within one year from the date of purchase, but does not include damage to fuse and damage caused by human factors.

2 Introduction

XXXX55 is a 5½ digits, 240000 counting, dual digital benchtop true-RMS multimeter.The STM32 chip and external double integral AD used by this benchtop multimeter providing accurate measurement

and stable performance. 3.5 inch 320 * 480 high resolution TFT LCD screen makes a clear reading, rich display, and a good visual effects. This benchtop multimeter are powered by electricity and provide full-function, full-range overload protection. Fresh and simple design with excellent performance makes them an ideal choice for electricians, electronics enthusiasts, engineers and colleges and universities.

2.1 Main features

- 5½ digits, 240000 counting.
- 3.5-inch 320 * 480 TFT LCD.
- Dual parameter display: it can display two parameters of the same input signal.
- Measurement display rate: FAST (7 times / second), MID (5 times / sec), SLOW (2 times / sec).
- Trigger mode: Automatic trigger, single trigger, external trigger.
- Range switching mode: Auto / Manual.
- 12 basic measurement functions: AC and DC voltage, AC and DC current, two-wire / four-wire resistance, period / frequency, diode, on-off test, capacitance, duty cycle.
- DCV basic accuracy: 0.01%.
- Additional functions: Data hold, data storage, data readback.
- Mathematical functions: MX+B/MAX/MIN/Average/dB/dBm/Rel/Limits Compare/ Statistics/%/ 1/X.
- Temperature: Thermocouple: K/N/R/S/T/B/E/J/WRe325/WRe526; Thermal resistance: PT100 / PT50 / Cu100 / Cu50.
- Built-in thermocouple cold junction temperature compensation.Support Manual or Auto temperature compensation mode.
- keys can be locked.
- Open calibration function.
- Square wave output.
- Provide system settings, can configure the language, buzzer, screen brightness, interface display style.
- Communication Interface: Standard: USB Device, RS232; Optional: USB Host, GPIB, LAN, WIFI, Bluetooth.
- Support SCPI protocol.

2.2 General features

1. Power supply voltage: 220V AC±10%,110V AC ±10%,45-65Hz.
2. Working environment:: 0~40℃, relative humidity <80%.
3. Storage environment:: -10~50℃, relative humidity <80%.
4. Dimensions: 265mm*105mm*305mm(width*height*depth).
5. Weight: 2.3kg.

3 Quick reference

3.1 check the accessories of the product

Confirm the following accessories of the multimeter, among which the optional accessories are delivered if only ordered. If any items are missing, please contact the nearest sales office.

Standard accessories:

A pair of proes.

A double end three-wire power line.

Two backup power fuse.

User manual.

Optional accessories:

RS232 serial line.

USB cable.

GPIB cable.

Cable.

Standard and optional function/information of communication interface:

Standard communication interface	USB Device, RS232
Optional communication interface	GPIB, USB Host, LAN, WIFI, Bluetooth
Standard function	Square wave output, External trigger

Table 3- 1 Standard/optional functions and communication interfaces.

3.2 Appearance of the front panel

Front panel as shown in Figure 3- 1, the regional description see Table 3- 2.

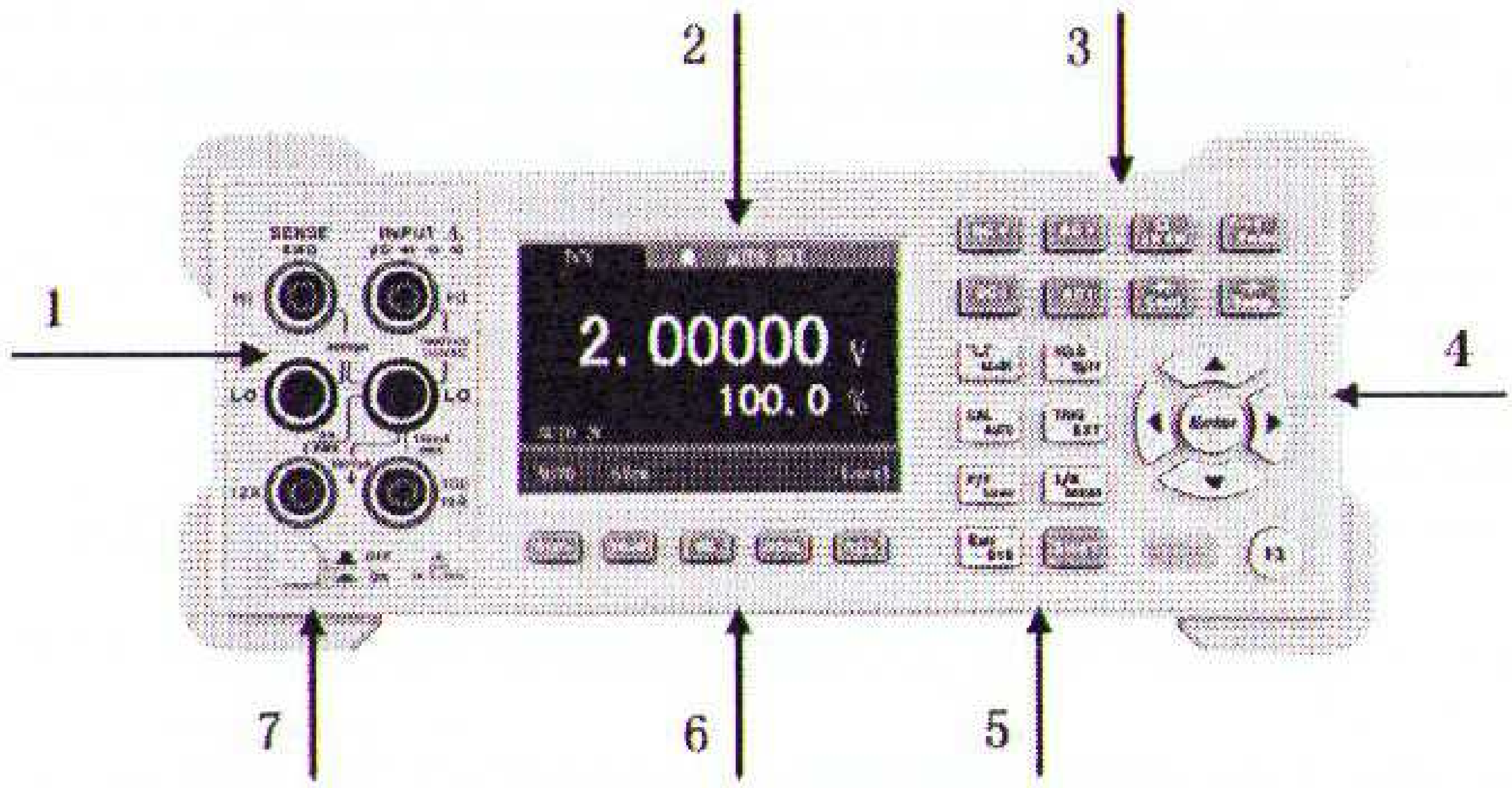


Figure 3- 1 Front panel diagram

NO.	Description
1	Measurement teminal of multimeter.
2	Display screen.
3	Basic measurement function keys.
4	Arrow keys.
5	Mathematical function keys.
6	Additional function keys.
7	Power key.

Table 3- 2 Area description of front panel.

3.3 Display interface

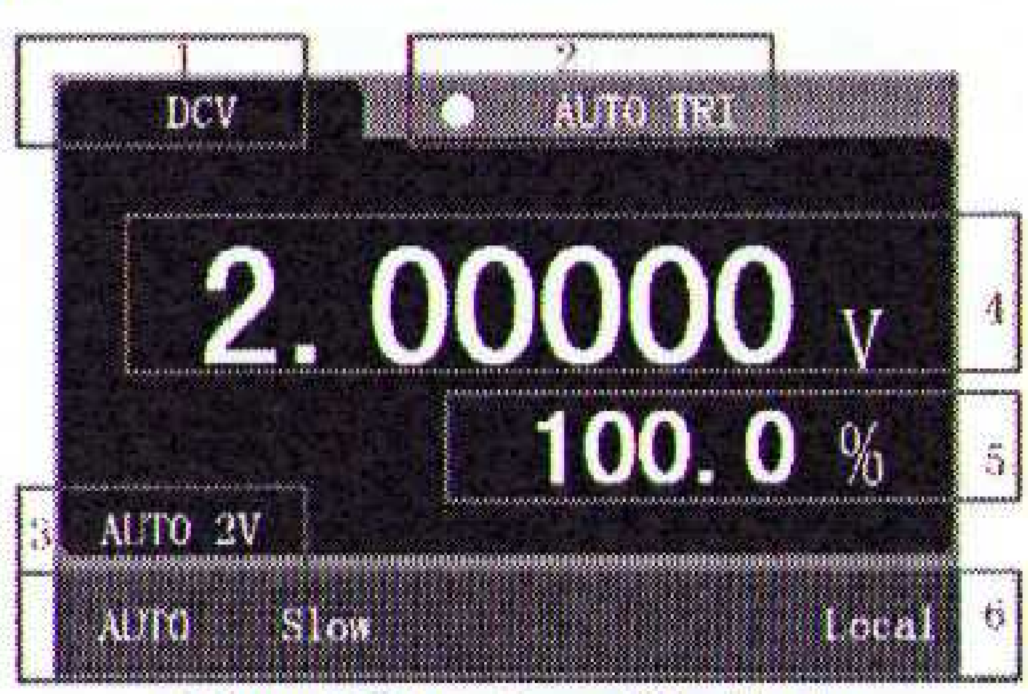


Figure 3- 2 Interface of the display

NO.	Description
1	Displays the name of the current measurement function.
2	Display Trigger Mode: Auto Trigger, Single Trigger, External Trigger.
3	Display only in automatic mode, indicate the currently range.

4	Main display area. Displays the current measured value.
5	Secondary display area. Displays additional information about the current measured value.
6	The configuration area of the current measurement function. Display range, measurement speed, additional functions, local / remote information.

Figure 3- 3 Description of the interface area

3.4 Keys introduction

3.4.1 Power Switch key

Trun On / Off the main power.

3.4.2 Arrow keys

Up arrow key.

Down arrow key.

Enter key.

Left arrow key.

Right arrow key

3.4.3 Basic measurement function keys

DC voltage measurement key.

AC voltage measurement key.

DC current measurement key.

AC current measurement key.

2-wire / 4-wire resistance measurement key.

Capacitance measurement key.

Frequency / period measurement key.

Diode / on-off measurement key.

3.4.4 Mathmatic function keys

Statics key. In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (two-wire resistance, four-wire resistance), frequency, period, capacitance measurement function,press the key to turn on the statistical operation.(Contains the maximum, minimum, average, standard deviation, number of samples, range.)

MX + B function key combination. In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (two-wire resistance, four-wire resistance), frequency, peiod, capacitance measurement function, press the key combination to turn on the MX + B measurement function. Press the combination key again to exit the MX + B function.

dB measurement key. In the voltage (DC voltage, AC voltage) measurement function,

press the key, the dB value of the measured value will be displayed on the secondary display area. The reference voltage can be modified, the default is 1V.

dBm measurement key. In the voltage (DC voltage, AC voltage) measurement function, press the key, the dBm value of the measured value will be displayed on the secondary display area. The reference resistance can be modified, the default is 600Ω.

Relative value measurement key. In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (two-wire resistance, four-wire resistance), frequency, period, capacitance measurement function, press the key, the measured value will be subtracted from the relative value in the secondary display area and displayed in the main display. Ie the main value = the measured value - the relative value. Relative value can be modified.

3.4.5 Additional function keys

AC+DC Square wave output key. Press the key, a amplitude fixed, frequency adjustable square wave will be output from the rear panel.

HOLD DUTY Duty cycle measurement key. Press the key to turn on the duty cycle measurement function.

CAL AUTO Automatic key. In manual range mode, press the key to switch to auto range. In external trigger / single trigger mode, press the key to change the trigger mode to auto trigger.

TRIG EXT Single trigger key. Press the key to change the multimeter measurement mode to single trigger. Each time the key is pressed, the meter measures once and displays a reading.

P/F SAVE Save key. Press the key to save the relevant information of the current measured value; press the key again to exit the data save function.

1/X MEM Data read back key. Press this key to enter the data readback function. Press any of the basic measurement function keys to exit the data readback function. The data readback function displays relevant information about the measured values that have been stored. Press the up / down arrow key to select the measured values for a specific sequence number.

EXIT SYS System settings key. Press the key to view the instrument model, serial number, version number, but also can set the language, switch buzzer, adjust the screen brightness, switch the interface display style.

3.4.6 Second function key combination

+ HOLD DUTY Reading hold function key combination. Press the key combination, the instrument readings remain unchanged, press the key combination again to exit the reading hold function.

+ AC+DC AC + DC measurement function key combination Press the key combination to start AC + DC signal measurement, press the key combination again to exit AC + DC measurement function.

+ TRIG EXT External trigger function key combination. Press the key combination to turn on

the external trigger measurement mode. In this mode, when the external trigger terminal enters a negative pulse, the meter measures once and displays a reading.

+ CAL AUTO Calibration function key combination. In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (two-wire resistance, four-wire resistance), capacitance measurement function, press the key combination to enter the corresponding calibration function. Press any of the basic measurement function keys to exit the calibration function.

+ P/F SAVE Limit comparison function key combination. In the voltage (DC voltage, AC voltage) measurement function, press the key combination to turn on the Limit comparison function. The Limit comparison value can be modified.

+ EXIT SYS Exit key. Press this key to switch from the current measurement function to the basic measurement function before the last function switch.

+ The temperature measurement function key combination. Press the key combination to turn on the temperature measurement function. Depending on the type of temperature sensor used, press the up / down / left / right arrow key to select the corresponding temperature sensor type for temperature measurement.

+ System help key combination. In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (two-wire resistance, four-wire resistance), frequency, peiod, capacitance measurement function, press the key combination to view the system help information.

3.5 Rear panel introduction

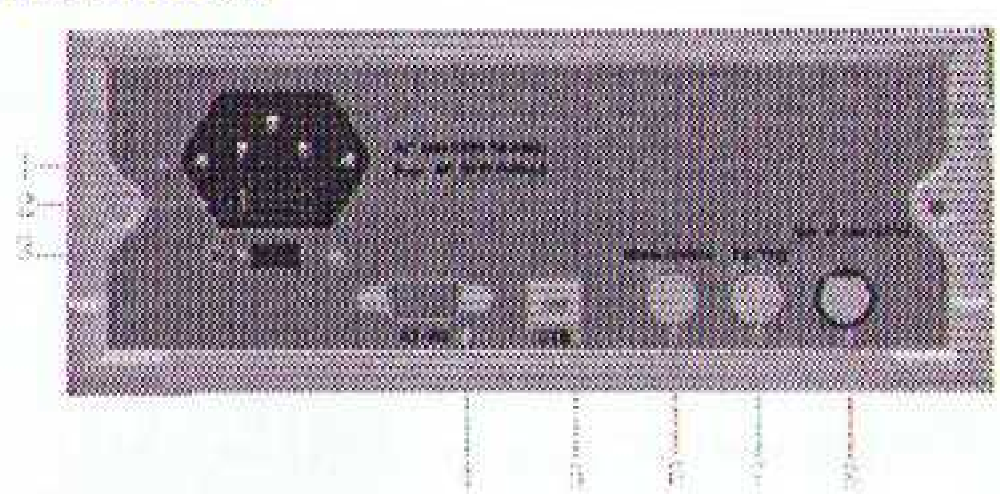


Figure 3-4 Rear panel diagram (standard part only)

NO.	Description
1	Power jack: AC 220V / 50Hz power supply input socket.
2	Power fuse: 0.5A / 250V fuse.
3	Voltage selector: 110V / 50Hz VAC or 220V / 50Hz VAC.
4	RS232 interface.
5	USB Device interface.
6	Square wave output port.
7	External trigger measurement port.
8	Current input fuse: 0.5A / 250V.

Table 3-3 Description of the rear panel

3.6 Adjust the handle

To adjust the handle of the digital multimeter, hold the handle on both sides of the body and pull it outward. Then rotate the handle to the desired position. The operation method is shown in Figure 3-5. The multimeter can be placed as shown in Figure 3-6, and the location of the carrying as shown in Figure 3-7.



Figure 3- 5 Adjust handle

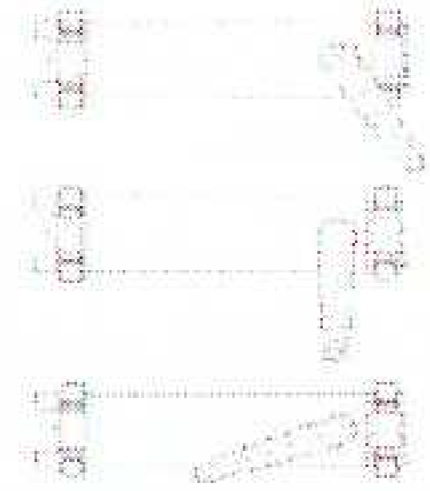


Figure 3- 6 Working position



Figure 3- 7 Carrying position

3.7 Turn on the multimeter

Connect the AC power supply

1. Multimeter power supply can choose 110V or 220V, adjust the power supply voltage selector on the rear panel of the multimeter according to the supply voltage.
2. Use the provided power cord to connect the multimeter to AC power.

Start the multimeter

Press the power swithch key.

If the instrument does not start normally, follow the steps below to check:

1. Check if the power cord is in good contact.
2. Check if the power switch key is pressed.
3. Check if the power fuse has been blown, replace the fuse, if necessary.
4. If the above check is correct, the instrument has not yet started, please contact the relevant departments.

4 Basic measurement function

Warning:

1) Before measuring, make sure the wiring is correct. In order to avoid damage to the multimeter, and possible personal safety hazards, do not measure the voltage beyond the rated input limit.

2) After the voltage up to 1000 VDC is measured, it is better to wait for about 2 minutes, and then conduct the low voltage measurement with the resolution rate 1 to 10 μV.

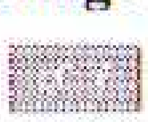
3) After using the A input terminal for measuring high currents, it is better to wait for about 10 minutes, and then conduct the low-level DC measurements (volts, amps, or ohms) in order to achieve accuracy. The reason is that measuring the thermal voltage generated by the high current may cause errors in the low-level measurements.

4) After the completion of all measurements, disconnect the probe and the circuit under test and remove the probe from the input terminal of the instrument.

5) When measuring the high voltage and high current, pay special attention to safety.

4.1 Voltage measurement

4.1.1 DC Voltage measurement

1. Press  to select the DC voltage measurement function. The measurement interface is shown in Figure 4- 1.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 2.
3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing 

, press the left / right arrow key to select the appropriate measurement speed.
4. Start the measurement.

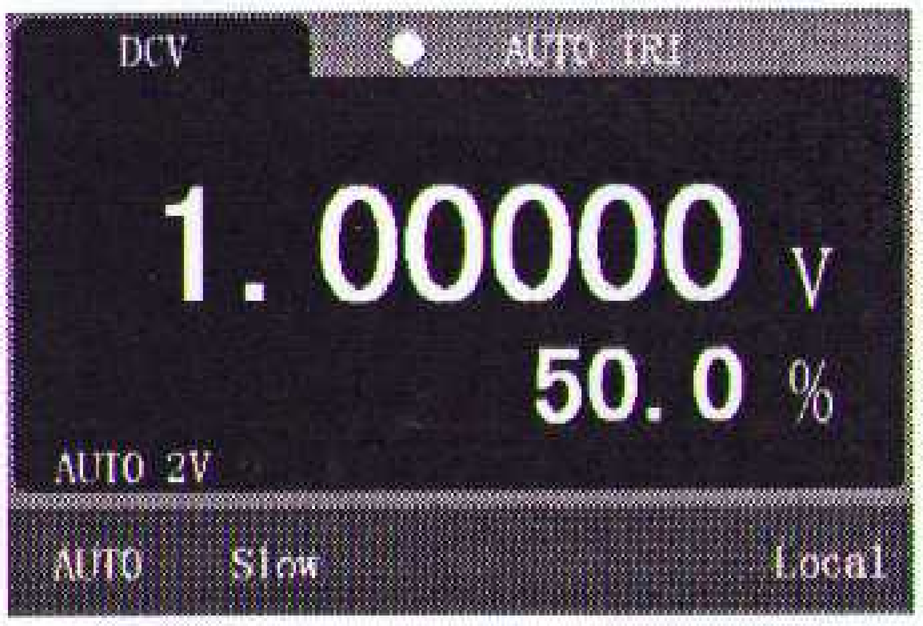


Figure 4- 1 Measurement interface

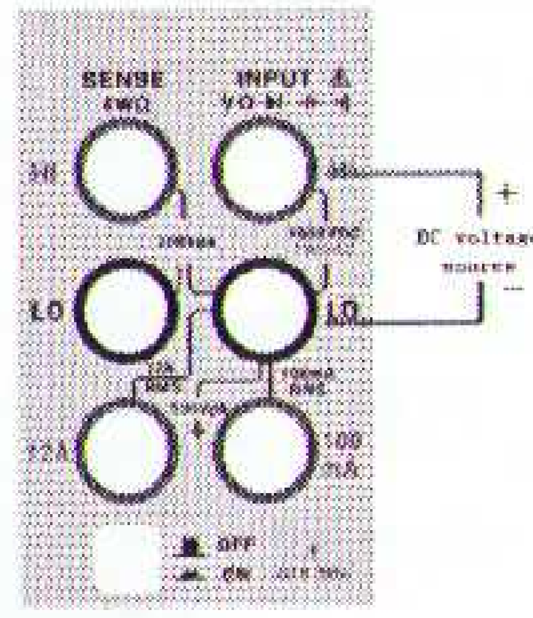


Figure 4- 2 Wiring method

Note:

1) The measured voltage value is displayed in the main display area, and the value in the secondary display area represents the ratio of the current measured value to the full scale value.

2) Full range input protection: 1000V DC.

4.1.2 AC voltage measurement

1. Press [key] to select the AC voltage measurement function. The measurement interface is shown in Figure 4- 3.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 4.
3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO, press the left / right arrow key to select the appropriate measurement speed.
4. Start the measurement.

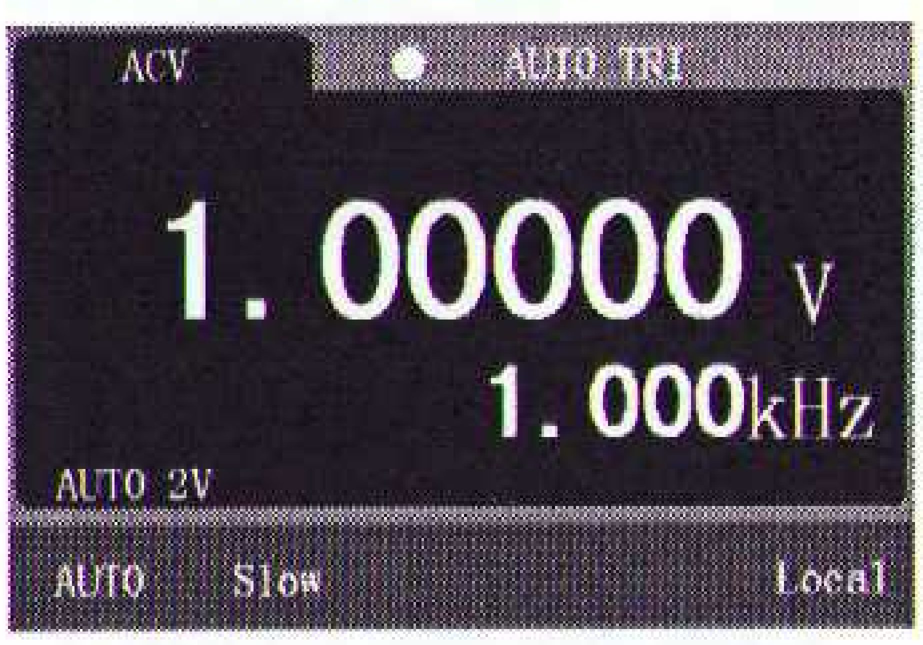


Figure 4- 3 Measurement interface

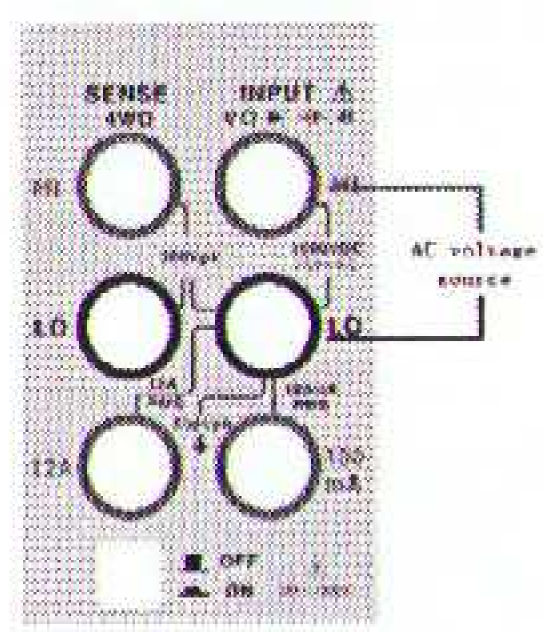


Figure 4- 4 Wiring method

Note:

1) The measured voltage value is displayed in the main display area, and the value in the secondary display area represents the measured frequency of the current input signal.

2) To ensure accuracy, the input value should be greater than 10% of the range, and not higher than the range of 90%.

3) Full range input protection: 750V RMS.

4.2 Current measurement

Note:

1) The fuses used for low current measurement is 0.5A 250V and 10A 250V for high current measurement.

2) Try to avoid high current for a long time continuous measurement, pay attention to the protection of personal safety.

3) Low current measurement in the automatic mode does not switch to a higher current range, please pay attention to the timely adjustment of the input terminal wiring.

4) High current measurement in the automatic mode does not switch to a lower current range, please pay attention to the timely adjustment of the input terminal wiring.

4.2.1 DC current measurement

1. Press to select the DC current measurement function. The measurement interface is shown in Figure 4- 5.

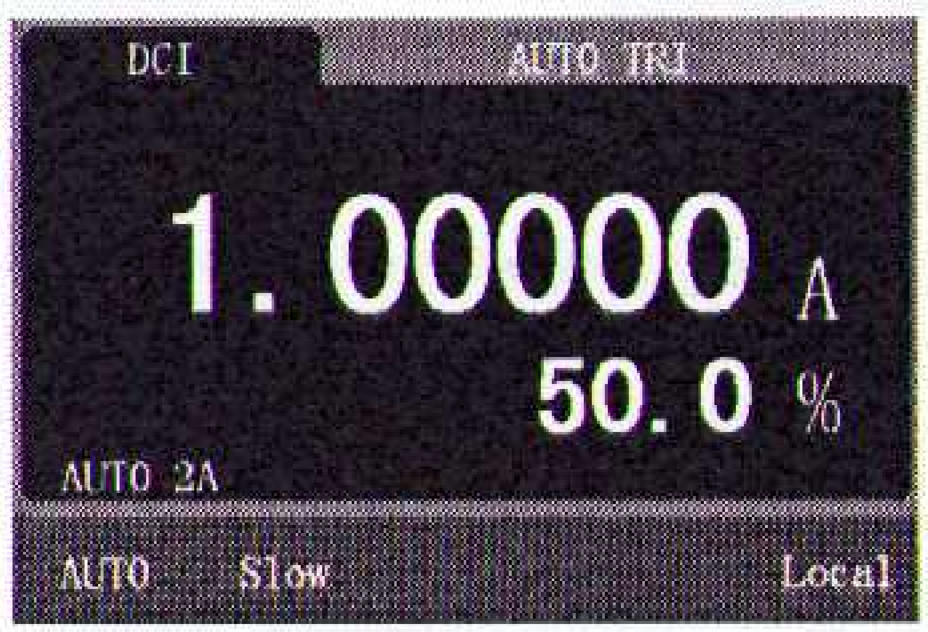


Figure 4- 5 Measurement interface

Note:

The measured current value is displayed in the main display area, and the value in the secondary display area represents the ratio of the current measured value to the full scale value.

2. Choose different test terminals according to the measurement level. See Figure 4- 6 for current of 200mA and below, and connect the red and black test leads respectively to the proper input terminals. See Figure 4- 7 for current from 200mA to 10A, and connect the red and black test leads respectively to the proper input terminals.

3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO, press the left / right arrow key to select the appropriate measurement speed.

4. Start the measurement.

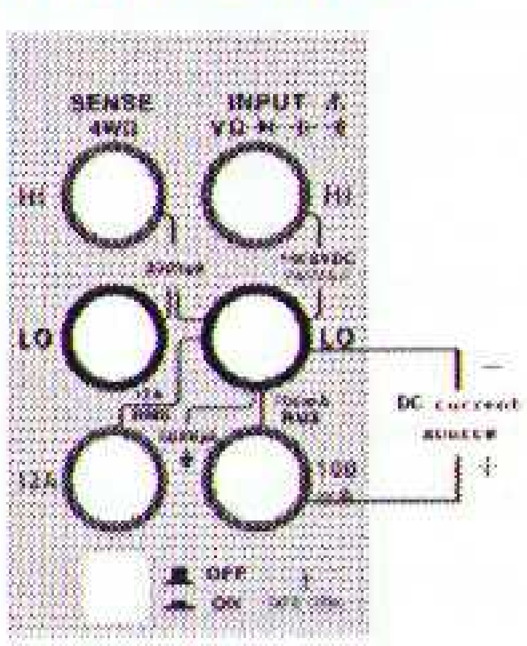


Figure 4- 6 Wiring method for low current measurement

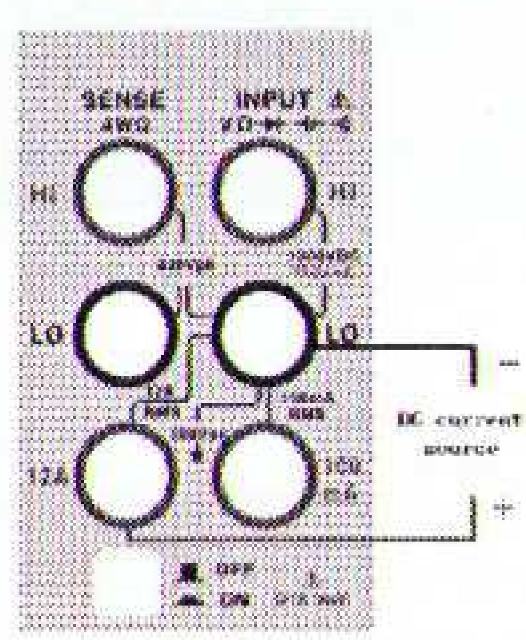


Figure 4- 7 Wiring method for high current measurement

4.2.2 AC current measurement

1. Press to select the AC current measurement function. The measurement interface is shown in Figure 4- 8.

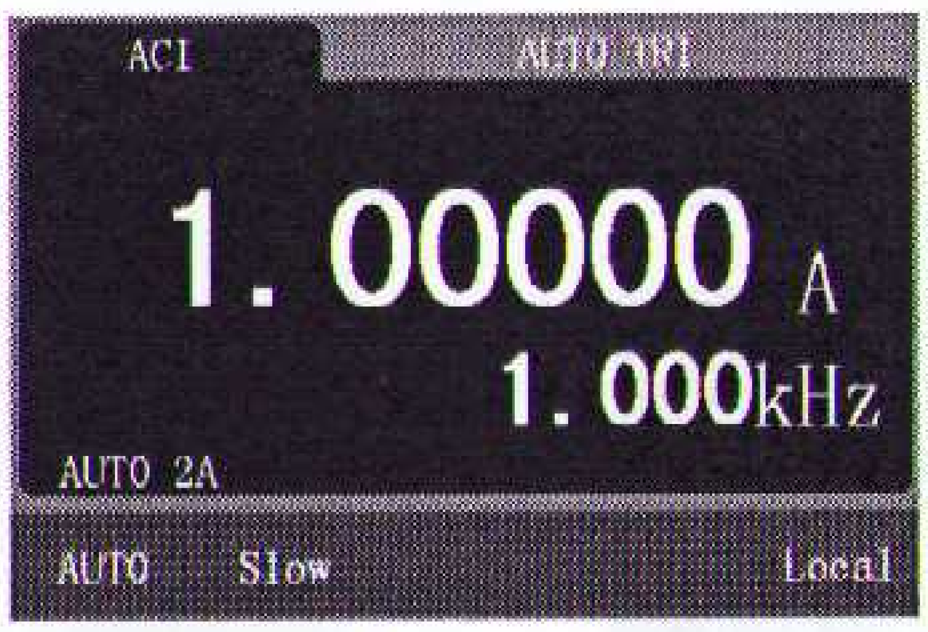


Figure 4- 8 Measurement interface

Note:

The measured current value is displayed in the main display area, and the value in the secondary display area represents the measured frequency of the current input signal.

2. Choose different test terminals according to the measurement level. See Figure 4- 9 for current of 200mA and below, and connect the red and black test leads respectively to the proper input terminals. See Figure 4- 10 for current from 200mA to 10A, and connect the red and black test leads respectively to the proper input terminals.

3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO, press the left / right arrow key to select the appropriate measurement speed.

4. Start the measurement.

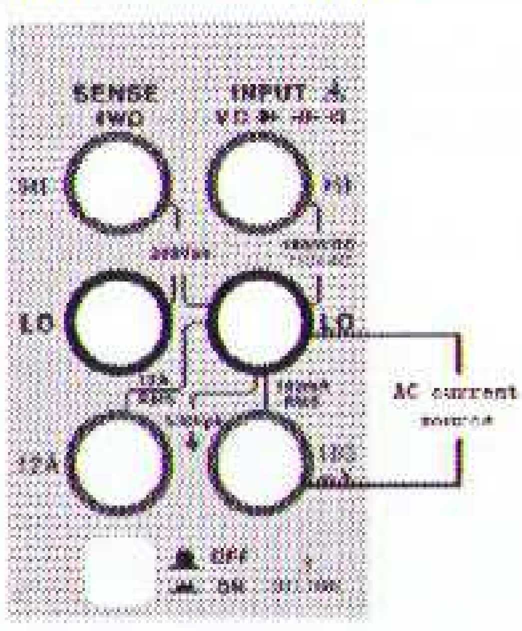


Figure 4- 9 Wiring method for low current measurement

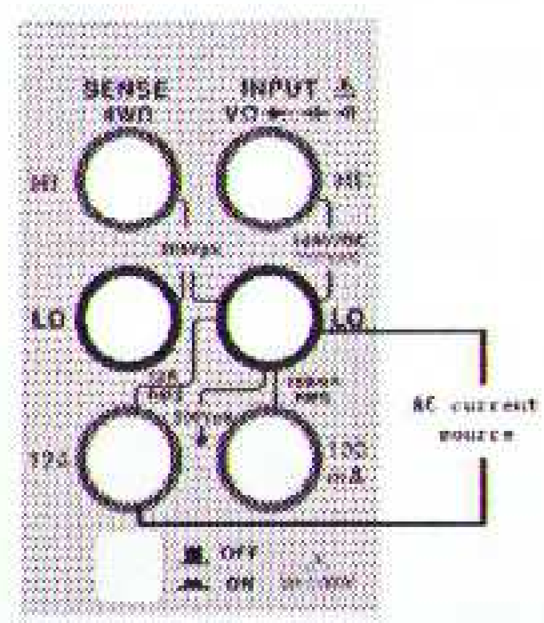


Figure 4- 10 Wiring method for high current measurement

4.3 Resistance measurement

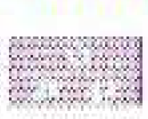
Note:

1) Before measuring the resistance, disconnect the circuit power and discharge all high-voltage capacitors to avoid damages to the multimeter.

2) In the case of 2-wire resistance measurement, the relative function can be considered in order to eliminate the error caused by the lead resistance.

3) 200MΩ range readings beating is a normal phenomenon.

4.3.1 2-wire resistance measurement

1. Press  to select the 2-wire resistance measurement function by default. The measurement interface is shown in Figure 4- 11.

2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 12.

3. Press the up / down arrow key to manually select the appropriate range or select the auto range

mode by pressing the CAL AUTO, press the left / right arrow key to select the appropriate measurement speed.

4. Start the measurement.



Figure 4- 11 Measurement interface

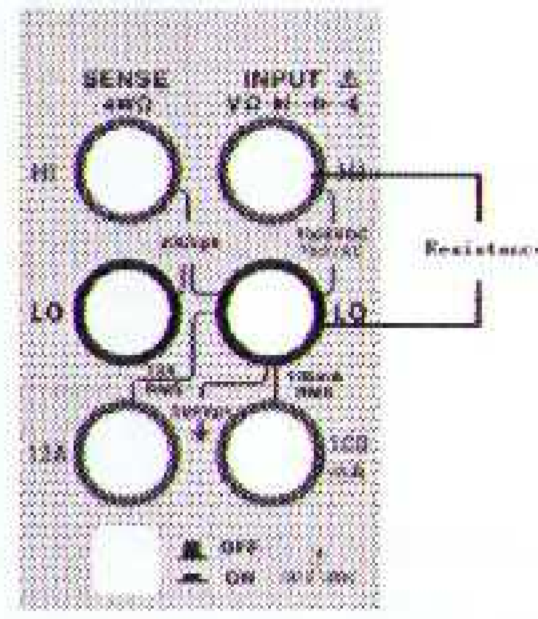


Figure 4- 12 Wiring method

Note:

The measured resistance value is displayed in the main display area, and the value in the secondary display area represents the ratio of the current measured value to the full scale value.

4.3.2 4-wire resistance measurement

1. In the 2-wire resistance measurement function, press again to select the 4-wire resistance measurement function. The measurement interface is shown in Figure 4- 13.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 14.
3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO, press the left / right arrow key to select the appropriate measurement speed.
4. Start the measurement.



Figure 4- 13 Measurement interface

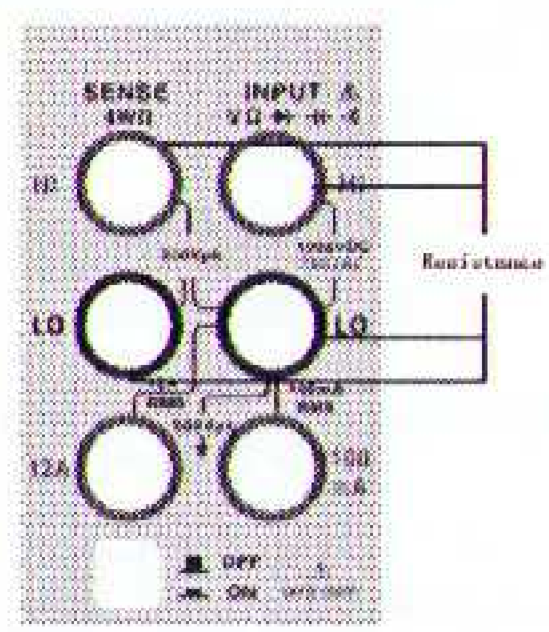


Figure 4- 14 Wiring method

Note:

The measured resistance value is displayed in the main display area, and the value in the secondary display area represents the ratio of the current measured value to the full scale value.

4.4 Frequency measurement and period measurement

4.4.1 Frequency measurement

1. Press to select the frequency measurement function by default. The measurement interface is shown in Figure 4- 15.

2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4-16.
3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO.
4. Start the measurement.



Figure 4- 15 Measurement interface

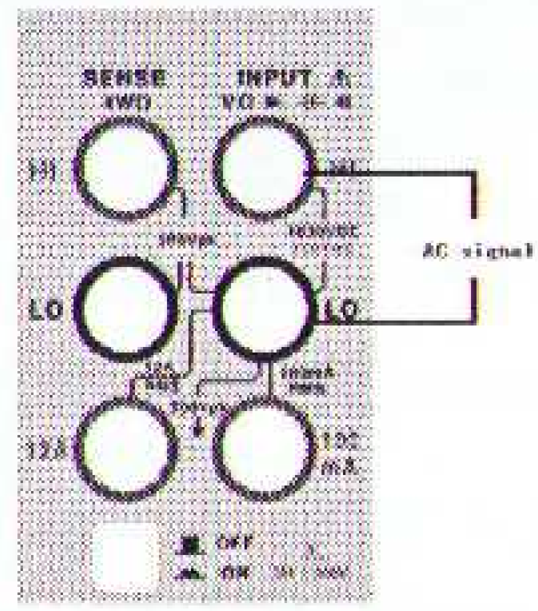


Figure 4- 16 Wiring method

4.4.2 Period measurement

1. In the frequency measurement function, press again to select the period measurement function. The measurement interface is shown in Figure 4- 17.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 18.
3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO.
4. Start the measurement.



Figure 4- 17 Measurement interface

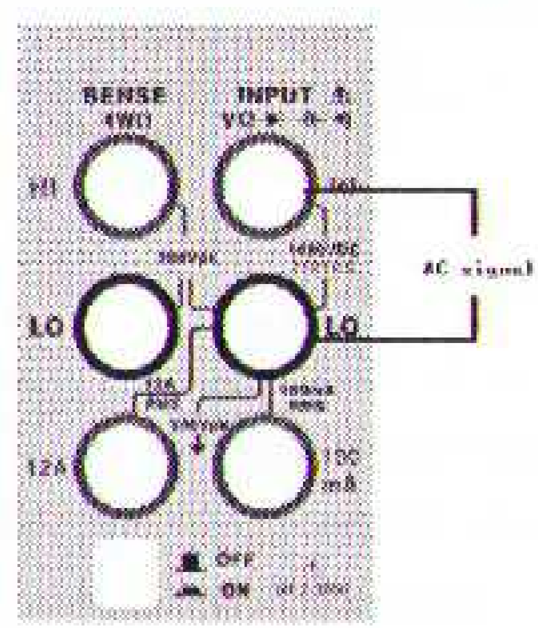


Figure 4- 18 Wiring method

4.5 Diode measurement and on-off measurement

Test conditions: the forward DC current is approximately 1mA, and the reverse DC voltage no higher than 3V.

4.5.1 Diode measurement

1. Press to select the diode measurement function by default. "OPEN" is displayed when the voltage value is higher than the measuring threshold, and the measured voltage is displayed when the measured value is below the measuring threshold. The diode threshold voltage is 3.2V The measurement interface is shown in Figure 4- 19.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 20.

3. Start the measurement.

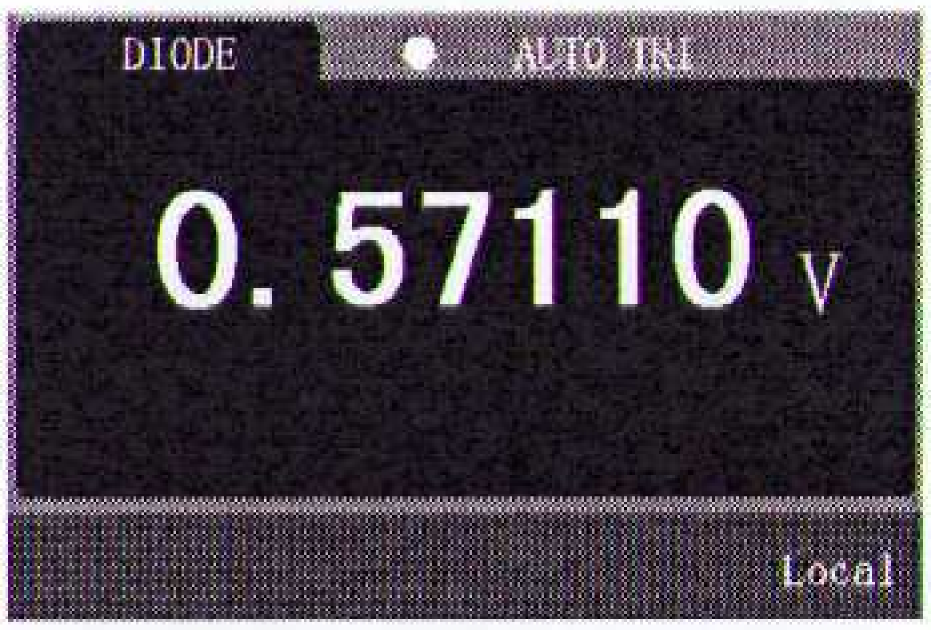


Figure 4- 19 Measurement interface

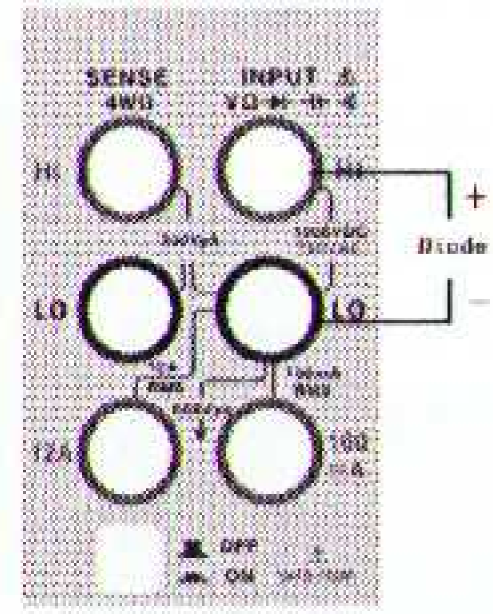


Figure 4- 20 Wiring method

4.5.2 On-off measurement

1. In the diode measurement function, press again to select the on-off measurement. The measurement interface is shown in Figure 4- 21.

2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 22.

3. Start the measurement.



Figure 4- 21 Measurement interface

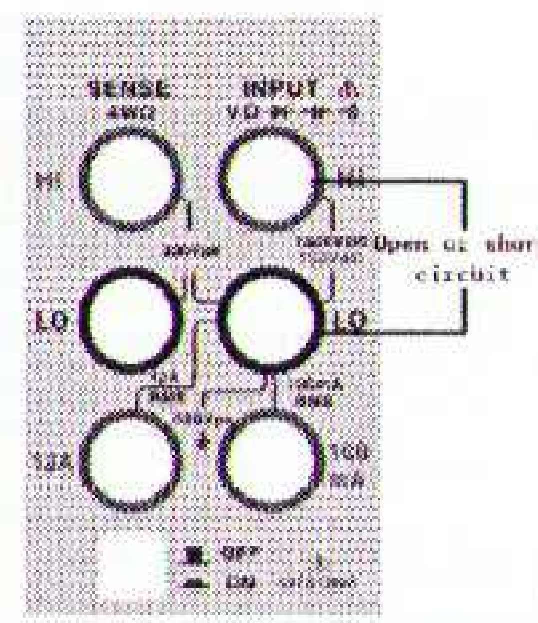


Figure 4- 22 Wiring method

Note:

1) When the measured resistance is greater than 2kΩ, display "OPEN", less than 2kΩ, display readings.

2) When the measured value is lower than the set short-circuit resistance value, the buzzer sounds. The short-circuit resistance value defaults to 30Ω.

3) The short-circuit resistance value can be set by pressing the Enter key in the on-off measurement interface and using the up, down, left and right direction keys to set between 0 and 2kΩ.

4.6 Capacitance measurement

1. Press to select the capacitance measurement function. The measurement interface is shown in Figure 4- 23.

2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4- 24.

3. Press the up / down arrow key to manually select the appropriate range or select the auto range mode by pressing CAL AUTO, press the left / right arrow key to select the appropriate measurement speed..

4. Start the measurement.

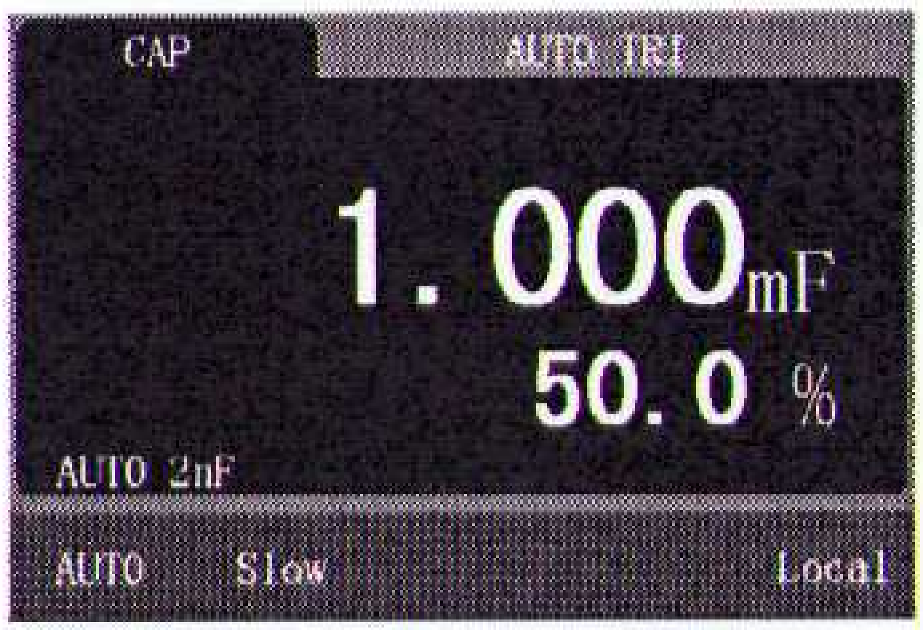


Figure 4-23 Measurement interface

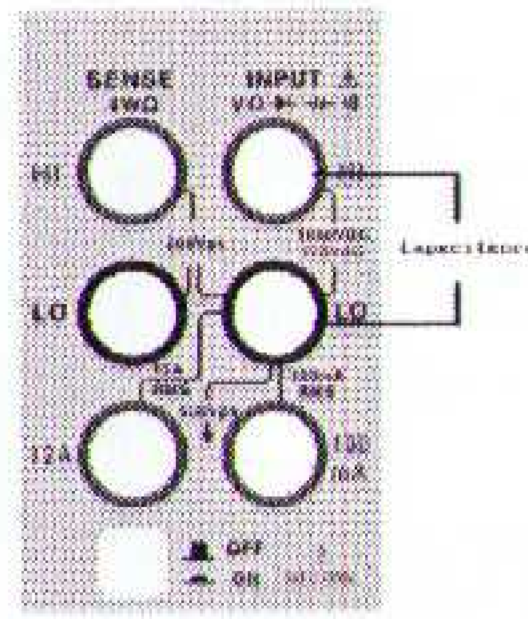


Figure 4-24 Wiring method

Note:

4) The measured capacitance value is displayed in the main display area, and the value in the secondary displayed area represents the ratio of the current measured value to the full scale value.

5) When measuring large capacitance, the measurement time is slightly longer due to the charge and discharge of the capacitor.

4.7 Duty cycle measurement

1. Press DUTY HOLD to select the duty cycle measurement function. The measurement interface is shown in Figure 4-25.
2. Connect the red and black test leads to the corresponding input terminals as shown in Figure 4-26.
3. Start the measurement.



Figure 4-25 Measurement interface

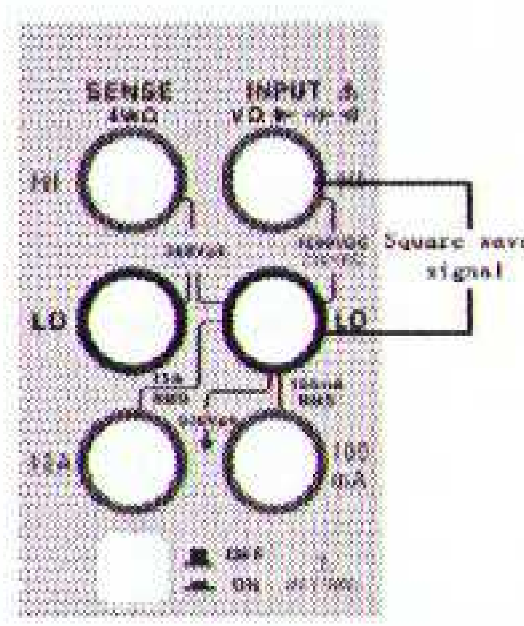
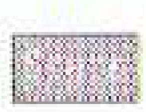


Figure 4-26 Wiring method

5 Additional measurement function

5.1 Statistics

In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (2-wire resistance, 4-wire resistance), frequency, period, capacitance measurement function:

Press  to turn on the statistical operation, as shown in Figure 5-1. Press the key again to exit statistical operation.

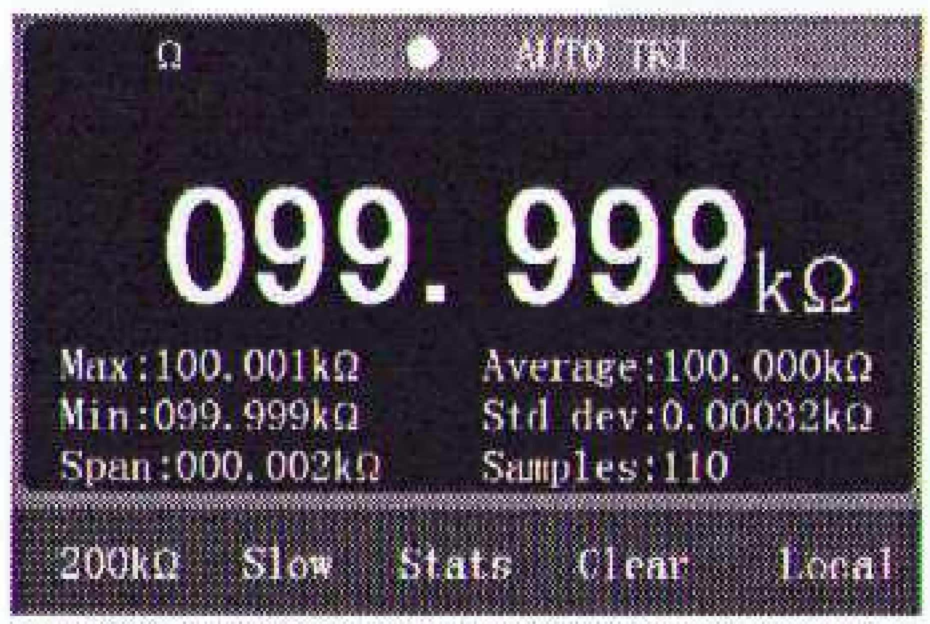


Figure 5- 1 Statistic measurement interface

Note:

1) When the statistical function is turned on, the maximum, minimum, average, he standard deviation, the number of samples, and the range(the subtract between the maximum value and the minimum value) is displayed simultaneously.

2) To re-statistics, you can press the clear softkey.

5.2 MX+B

In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (2-wire resistance, 4-wire resistance), frequency, period, capacitance measurement function:

Press key to select the MX + B function, as shown in Figure 5-2. Press the key again to exit the MX + B function.

Note:

1) Formula: Y = M * X + B, where Y is the value displayed in the secondary display area. M is a monomial coefficient, B is a constant.

2) In the interface shown in Figure 5-2, press the Enter key to call up the M value modification interface, as shown in Figure 5- 3. The value of M can be modified by the use of up / down / left / right arrow key.

3) In the interface shown in Figure 5-3, press the Enter key to call up the B value modification interface. The value of B can be modified by the use of up / down / left / right arrow key.

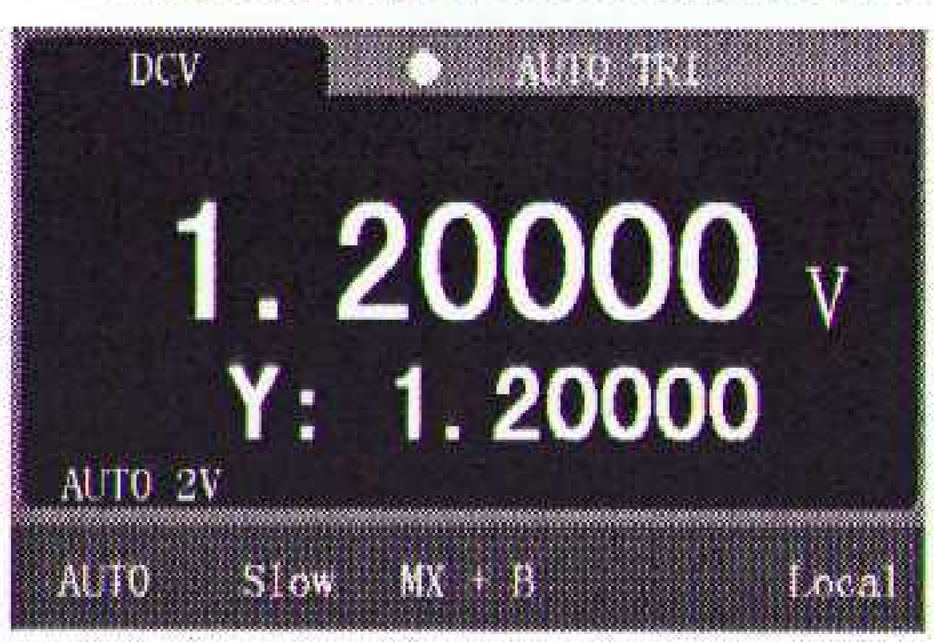


Figure 5- 2 MX + B measurement interface

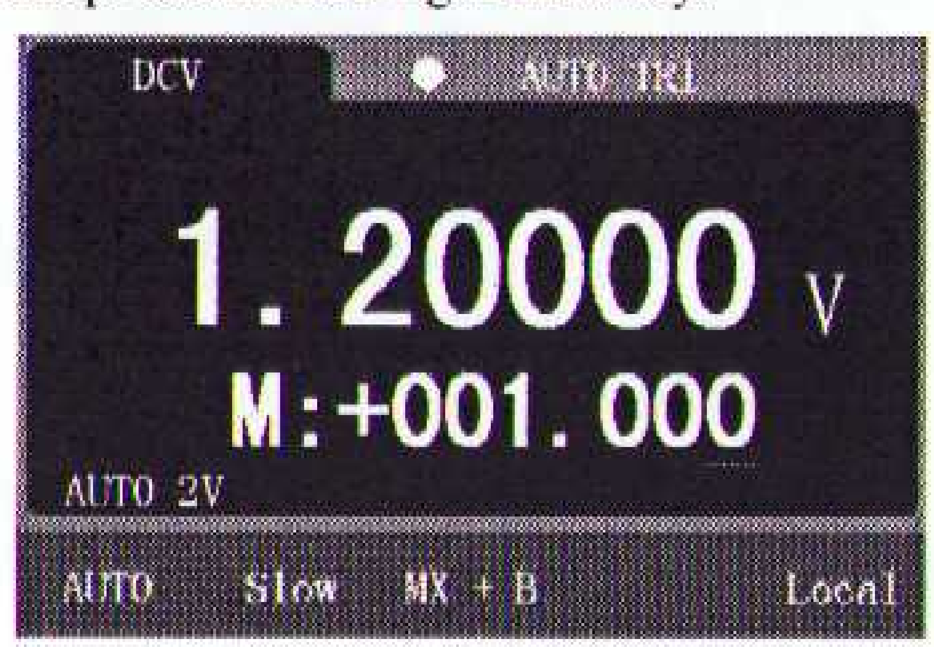


Figure 5- 3 M value modified interface

5.3 dB and dBm

In the voltage (DC voltage, AC voltage) measurement function:

1. Press to select the dB measurement function, as shown in Figure 5-4. Press again to exit the dB measurement function.

2. Press to select the dBm measurement function, as shown in Figure 5-6. Press

again to exit the dBm measurement function.

3. In the interface shown in Figure 5-4, press the Enter key to call up the dB reference voltage setting interface. The up / down / left / right array key can be used to modify the value of the dB reference voltage, as shown in Figure 5-5.

4. In the interface shown in Figure 5-6, press the Enter key to call up the dBm reference voltage setting interface. The up / down / left / right array key can be used to modify the value of the dBm reference voltage, as shown in Figure 5-7.



Figure 5-4 dB measurement interface

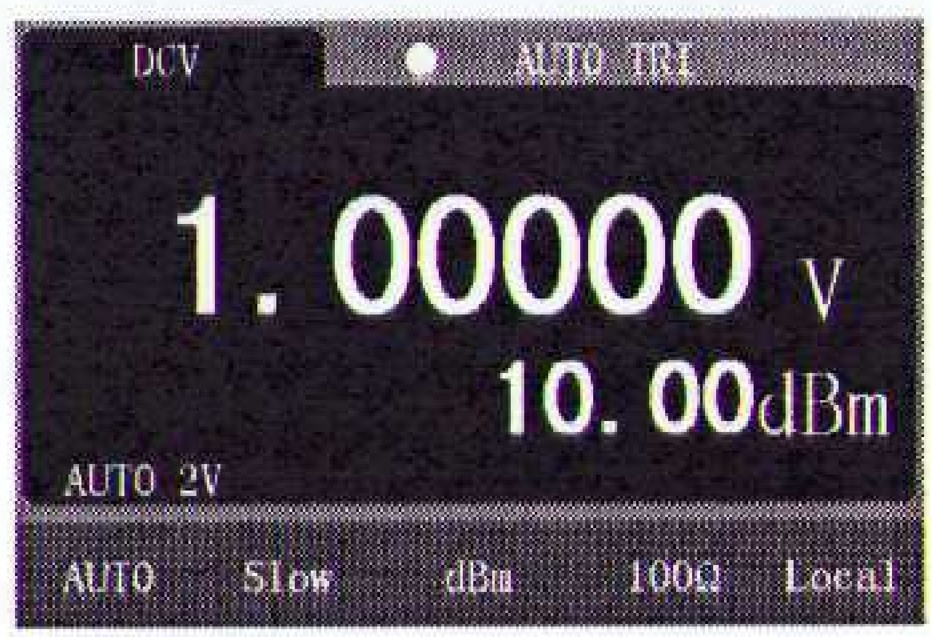


Figure 5-6 dBm measurement interface



Figure 5-5 dB reference voltage modified interface



Figure 5-7 dBm reference resistance modified interface

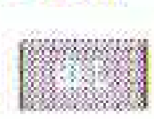
Note:

1) $dBm = 10*log10\,[(V_{Mea}^2/R_{ref})/0.001]$, where V_{Mea} is the measured value displayed in the main display area (in the case of a millivolt range, V_{Mea} is the measured value divided by 1000), R_{ref} is the reference resistance and defaults to 600Ω.

2) $dB = 20*log10(V_{Mea}/V_{Ref})$, where V_{Mea} is the measured value displayed in the main display area (in the case of a millivolt range, V_{Mea} is the measured value divided by 1000), V_{Ref} is the reference voltage and defaults to 1V.

5.4 REL

In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (2-wire resistance, 4-wire resistance), frequency, period, capacitance measurement function:

Press  to select the REL function, as shown in Figure 5-8. Press  again to exit the REL function.

In the interface of Figure 5-8, press the Enter key to call up the relative value setting interface. The up / down / left / right arrow key can be used to modify the relative value, as shown in Figure 5-9.

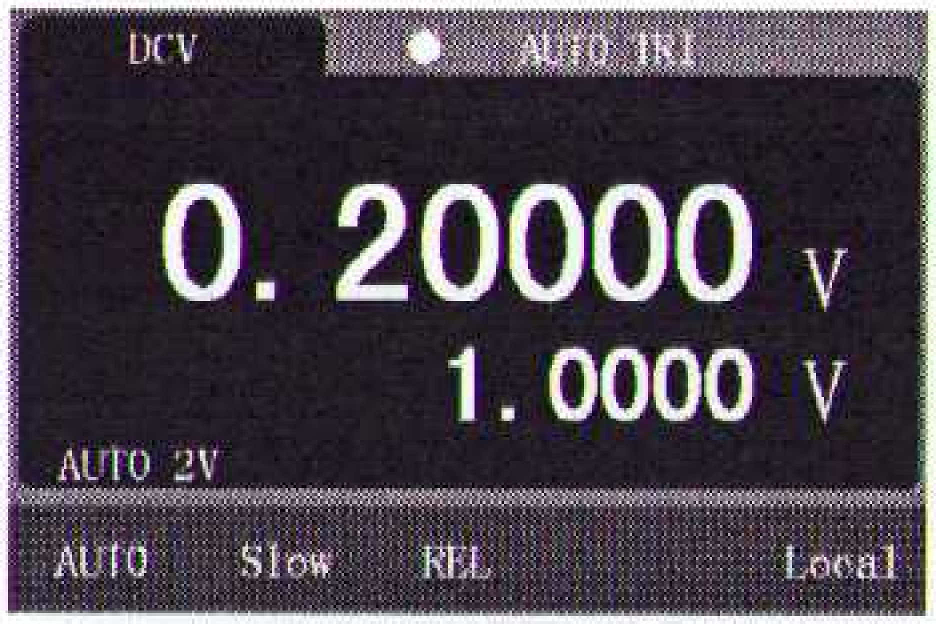


Figure 5- 8 REL measurement interface



Figure 5- 9 Relative value setting interface

5.5 Pass/Fail

In the voltage (DC voltage, AC voltage) measurement function:

1. Press  + 

key combination to select the Limits Compare operation, as shown in Figure 5- 10. Press the key combination again to exit the COMP HI function.

2. In the Limit comparison interface shown in Figure 5- 10, press the Enter key to call up the upper limit setting interface. The up / down / left / right arrow key can be used to modify the upper limit, as shown in Figure 5- 11.

3. In the upper limit setting interface, press the Enter key to call up the lower limit setting interface. The up / down / left / right arrow key can be used to modify the lower limit value.



Figure 5- 10 Limits comparison interface



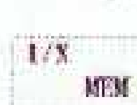
Figure 5- 11 Upper limit setting interface

Note:

When the measured value exceeds the upper limit or below the lower limit, the buzzer alarms. When the measured value is restored below the upper limit or above the lower limit, the buzzer no longer alarms.

5.6 1/X

In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (2-wire resistance, 4-wire resistance), frequency, period, capacitance measurement function:

Press  + 

key combination to select the inverse operation, as shown in Figure 5- 12.

Press the key combination again to exit the inverse operation.



Figure 5- 12 Inverse operation interface

Note:

The inverse function calculates the inverse of the current measured value.

5.7 Data storage and readback

In the voltage (DC voltage, AC voltage), current (DC current, AC current), resistance (2-wire resistance, 4-wire resistance), frequency, period, capacitance measurement function:

1. Press P/F SAVE to select the save function, as shown in Figure 5- 13. Press P/F SAVE again to exit the save function.

2. Press 1/X MEM to view the saved data, as shown in Figure 5- 14. Press 1/X MEM again to exit the data readback function.



Figure 5- 13 Data save function



Figure 5- 14 Data readback function

Note:

1) The save function saves the function name, trigger mode, range mode, display range, sampling rate, measured value, etc. under the measurement function.

2) In the data readback function, the up / down arrow key can be used to view the relevant information of the saved measured value in turn.

3) The save function can save up to 600 sets of data at the same time. If more than 600 groups, the earliest saved data will be discarded in turn.

5.8 Temperature

Press + key combination to select the temperature measurement function, as shown in Figure 5- 15 and Figure 5- 16.

Note:

1) Thermocouples and thermal resistors can be used in the temperature measurement function. Available thermocouple types are K, N, R, S, T, B, E, J, WRe325 and WRe326. Available thermal resistors types are : PT100, PT50, Cu100, Cu50.

2) The measurable temperature range depends on the type of temperature sensor used. The

instrument has been set within the various types of sensors within the full range of temperature data, theoretically can measure the full range of temperature.

3) In the interface shown in Figure 5- 15, press the left / right arrow key to switch the type of temperature sensor. Such as thermocouple, thermal resistance. Press the up / down arrow key to switch between the same type of temperature sensor. Such as K-type, N-type thermocouple and so on.

4) In the interface shown in Figure 5- 16, press the Enter key to manually adjust the thermocouple cold junction temperature value, but can also by the internal thermistor automatically cold junction temperature compensation.



Figure 5- 15 Thermal resistance temperature measurement



Figure 5- 16 Thermocouple temperature measurement

6 System settings

Press 

to enter the system setting interface, as shown in Figure 6- 1. In this interface, you can view the instrument model, serial number, version number, you can also set the language of the system, switch the buzzer, adjust the screen brightness, switch the interface display style by the up / down / left / right arrow key.

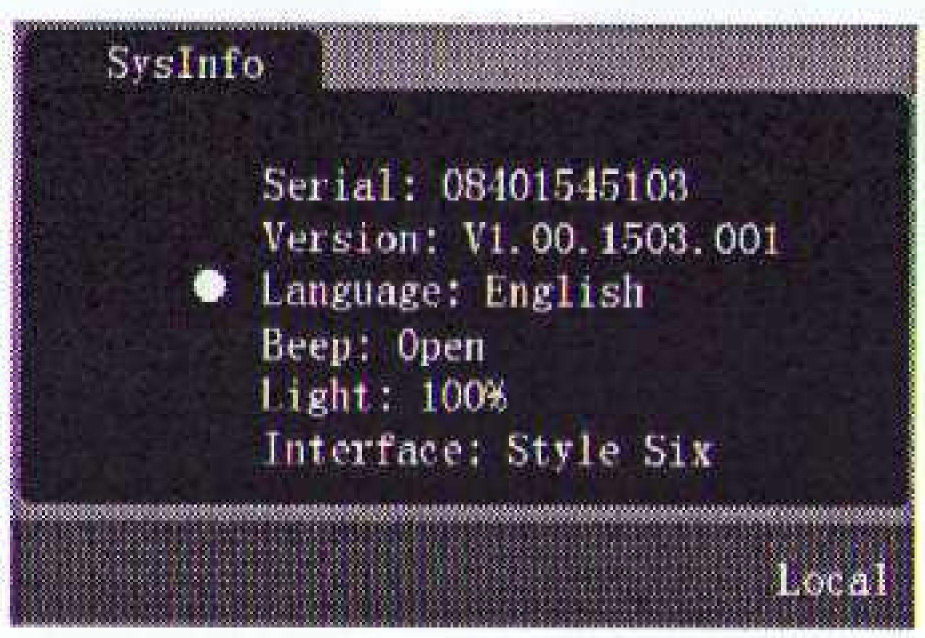


Figure 6- 1 System settings interface

6.1 Language switch

In the interface shown in Figure 6- 1, press the up / down arrow key to move the dot cursor to "Language", press the left / right arrow key to set the system language.

6.2 Buzzer switch

In the interface shown in Figure 6- 1, press the up / down arrow key to move the dot cursor to "Buzzer", press the left / right arrow key to switch the buzzer.

6.3 Screen brightness adjustment

In the interface shown in Figure 6- 1, press the up / down arrow key to move the dot cursor to "Light", press the left / right arrow key to adjust the screen brightness percentage.

6.4 Interface style selection

In the interface shown in Figure 6-1, press the up / down arrow key to move the dot cursor to "Interface", press the left / right arrow key to switch the display style of the interface.

7 Technical indicators

- Accuracy: ±(a%reading + digits), guaranteed period of one year.
- Ambient temperature: 18~28℃.
- Ambient humidity: 75%RH.
- Temperature coefficient: 0.1* (Accuracy)/℃.
- Preheating time: 30 minutes.

7.1 DC Voltage

Range	Accuracy	Resolution
200mV		0.001mV
2V	±(0.01%+3)	0.00001V
20V		0.0001V
200V	±(0.015%+3)	0.001V
1000V		0.01V

Table 7-1 DC Volage range indicators

Note:

1) Full range overload protection: 1000V. Except DCV1000V range, all other ranges are 120% overragne.

2) 200mV range and 2V range input impedance > 1GΩ; other ranges input impedance: 10MΩ。

7.2 AC Voltage(True RMS)

Range	Accuracy				Resolution
	20Hz~5kHz	5~30kHz	30~50kHz	50~100kHz	
200mV	±(0.3%+50)	±(0.5%+100)	±(1%+200)	±(2%+200)	0.001mV
2V	±(0.3%+50)	±(0.5%+100)	±(1%+200)	±(2%+200)	0.00001V
20V	±(0.3%+50)	±(0.8%+100)	±(2.5%+200)	±(5%+200)	0.0001V
200V	±(0.3%+50)	±(0.8%+100)	--	--	0.001V
750V	20Hz~1kHz	1~2kHz	--	--	0.01V
	±(0.5%+100)	±(0.8%+100)	--	--	

Table 7-2 AC Voltage range indicators

Note:

1) Except AC750V range, all other ranges are 120% overrange.

2) Full range overload protection: 750V RMS.

3) Input impedance: 1MΩ.

7.3 DC Current

Range	Accuracy	Resolution
200μA		0.001μA
2mA		0.00001mA
20mA	±(0.04%+10)	0.0001mA
200mA		0.001mA
2A		0.00001A
10A	±(0.2%+20)	0.0001A

Table 7-3 DC Current range indicators

7.4 AC Current(20Hz~10kHz)

Range	Accuracy	Resolution
200μA		0.001μA
2mA		0.00001mA
20mA	+(0.2%+100)	0.0001mA
200mA		0.001mA
2A		0.00001A
10A	+(0.8%+100)	0.0001A

Table 7-4 AC Current range indicators

7.5 Resistance

Range	Accuracy	Resolution
200Ω		0.001Ω
2kΩ	+(0.015%+3)	0.00001kΩ
20kΩ		0.0001kΩ
200kΩ		0.001kΩ
2MΩ	±(0.03%+5)	0.00001MΩ
20MΩ	±(0.1%+10)	0.0001MΩ
200MΩ	+(5%+20)	0.001MΩ

Table 7-5 Resistance range indicators

Note:

For range below 200MΩ, the open circuit voltage is about 3V

7.6 Capacitance

Range	Accuracy	Resolution
2nF	±(2%+5)	0.001nF
20nF		0.01nF
200nF		0.1nF
2μF	+(1%+5)	0.001μF
20μF		0.01μF
200μF		0.1μF
2mF	±(2%+5)	0.001mF
10mF		0.01mF

Table 7-6 Capacitance range indicators

7.7 Frequency

Range	Accuracy	Resolution
20Hz		0.0001Hz
200Hz		0.001Hz
2kHz		0.00001kHz
20kHz	±(0.005%+3)	0.0001kHz
200kHz		0.001kHz
2MHz		0.00001MHz
20MHz		0.0001MHz

Table 7-7 Frequency range indicators

Note:

The minimum frequency that can be measured is 1 Hz..

7.8 Diode

Range	Input protection	Description
0~2V	250Vp	Input Current is about 0.75mA。

Table 7- 8 Diode measurement indicator

Note:

Open circuit voltage is about 3.2V.

7.9 Conductance

Range	Resolution	Input protection	Description
0~2kΩ	0.001kΩ	250Vp	When the measured resistance is less than 30Ω, the buzzer sounds; when the reading is less than 2kΩ, "-OL-" is displayed when it exceeds. The threshold resistance can be set in the range of 0 to 2kΩ.

Table 7- 9 Conductance measurement indicator

Note:

Open circuit voltage is about 3.2V.

7.10 Duty Cycle

Range	Accuracy	Resolution
5.0%~95.0%	±(3%+20)	0.001

Table 7- 10 Duty cycle measurement indicator

7.11 Temperature

The range and error of the temperature measurement depends on the temperature sensor used. The temperature display accuracy is 0.01 ℃, the calculation error is less than 0.005%.

8 Calibration

Note:

1) Before calibration, it is required to preheat the instrument for more than 30 minutes. The accuracy of the standard source must be better than 3 ~ 5 times the accuracy of the calibrated instrument.

2) After a specific range was calibrated, the calibration data is immediately written to FLASH. So you can just calibrate a separate range.

3) In order to prevent inaccurate calibration due to wrong operation, it is required to enter a password before the calibration.

4) You can enter the calibration interface after input the correct password. Take the interface of DCV calibration as an example.

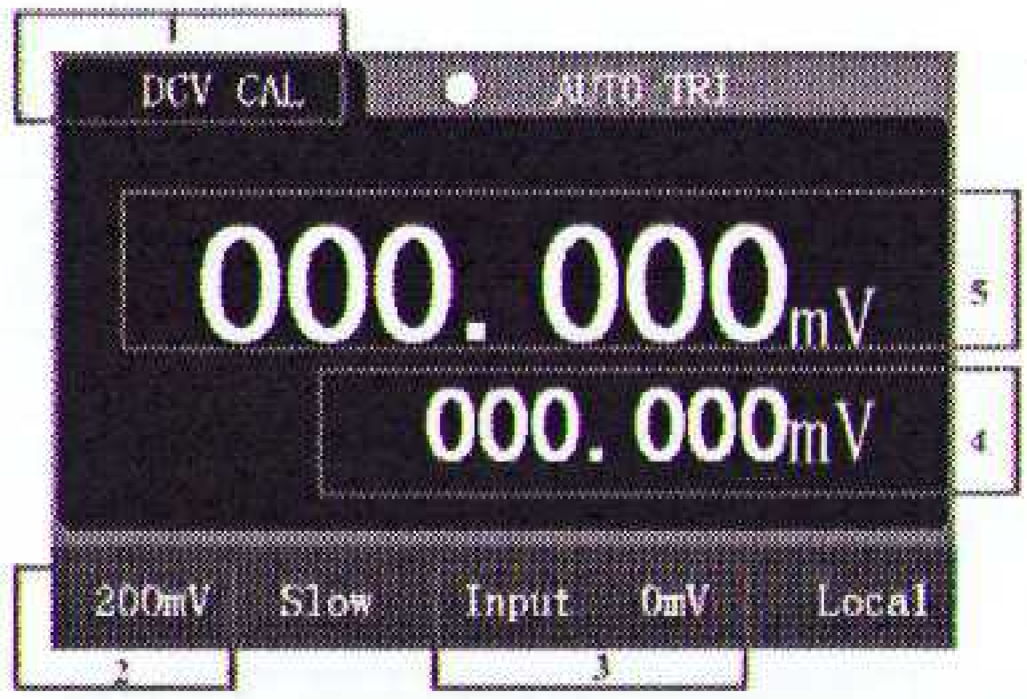


Figure 8- 1 Calibration interface

NO.	Description
1	Indicates the currently calibrated function.
2	Indicates the current calibration range.
3	Indicates the value of the standard source that needs to be entered.
4	Used to enter true values. The arrow keys can be used to modify this value.
5	Current measured value.

Table 8- 1 Calibration interface description

8.1 DC voltage calibration

Two ways to enter the DC voltage calibration:

1. In the DC voltage measurement function, press [illegible] + CAL AUTO key combination, and enter the correct password.
2. Send the corresponding SCPI instruction to muitimeter.

Through the panel button to enter the DC voltage calibration function, the start calibration range is the display range before switch. If the calibration function is entered by remote command., the calibration start range is the minimum display range for DC voltage measurement. For example, the minimun display range in DC voltage measurement is 200mV, so the calibration start range is 200mV,after a remote instruction.

200mV calibration steps:

1. Enter 0mV according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value in area 5 is stable.
2. Enter -200mV according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
3. Enter 200mV according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
4. The calibration program jump to 2V range automatically.

At this point, 200mV range calibration is completed, the calibration data written to FLASH. If the calibration function is exited at this time, a separate calibration of 200mV is completed.

2V calibration steps:

1. Enter 0V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value in area 5 is stable.
2. Enter -0.5V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
3. Enter -1V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.

4. Enter -1.6V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
5. Enter -2.2V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
6. Enter 2V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
7. The calibration program jump to 20V range automatically.

At this point, 2V range calibration is completed, the calibration data written to FLASH. You can press any of the basic function keys to exit the calibration function, or you can choose to continue calibrating the next range.

20V calibration steps:

1. Enter 0V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value in area 5 is stable.
2. Enter 20V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
3. The calibration program jump to 200V range automatically.

At this point, 20V range calibration is completed, the calibration data written to FLASH. You can press any of the basic function keys to exit the calibration function, or you can choose to continue calibrating the next range.

200V calibration steps:

1. Enter 0V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value in area 5 is stable.
2. Enter 200V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
3. The calibration program jump to 1000V range automatically.

At this point, 200V range calibration is completed, the calibration data written to FLASH. You can press any of the basic function keys to exit the calibration function, or you can choose to continue calibrating the next range.

1000V calibration steps:

1. Enter 0V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value in area 5 is stable.
2. Enter 1000V according to the prompt of zone 3 in Figure 8- 1. Press Enter key after the measured value is stable.
3. Area 4 shows "OK".

At this point, the DC voltage calibration is completed. The calibration completion interface is shown in Figure 8- 2. At this time, you can press any of the basic function keys to exit the calibration function.



Figure 8- 2 DC voltage calibration is completed

8.2 AC voltage calibration

AC voltage calibration is more cumbersome, calibration by user is not recommend. If you has the ability and conditions for calibration, please refer to the AC voltage measurement for wiring, calibration steps refer to the DC voltage calibration.

8.3 DC current calibration

Please refer to the DC current measurement for wiring, calibration steps refer to the DC voltage calibration.

Two ways to enter the DC current calibration:

1. In the DC current measurement function, press the + CAL AUTO key combination, and correctly enter the calibration password to enter the DC current calibration function. In this way, you can start calibration from any range or calibrate a particular range.
2. The DC current calibration function can also be entered via a specific remote command. In this way, calibration can only be started from the minimum range.

The calibration values that need to be entered for each range are shown below:

1. 200μA range need to enter 0 μA and 200 μA total of two values.
2. 2mA range need to enter 0 mA and 2 mA total of two values.
3. 20mA range need to enter 0 mA and 20 mA total of two values.
4. 200mA range need to enter 0 mA and 200 mA total of two values.
5. 2A file need to enter 0 A and 2 A total of two values.

Warning:

DC current calibration, when the range is switched from 200mA to 2A, to ensure that the multimeter and personal safety, please promptly adjust the input terminal wiring.

8.4 AC current calibration

Please refer to the AC current measurement for wiring, calibration steps refer to the DC voltage calibration.

Two ways to enter the AC current calibration:

1. In the AC current measurement function, press the + CAL AUTO key combination, and correctly enter the calibration password to enter the AC current calibration function. In this way, you can start calibration from any range or calibrate a particular range.
2. The AC current calibration function can also be entered via a specific remote command. In this way, calibration can only be started from the minimum range.

The calibration values that need to be entered for each range are shown below:

1. 200μA range need to enter 0 μA and 200 μA total of two values.
2. 2mA range need to enter 0 mA and 2 mA total of two values.
3. 20mA range need to enter 0 mA and 20 mA total of two values.
4. 200mA range need to enter 0 mA and 200 mA total of two values.
5. 2A range need to enter 0.2A, 0.4A, 0.6A, 0.8A, 1A, 1.2A, 1.4A, 1.6A, 1.8A and 2A total of ten values.
6. 10A range need to enter 1A and 2A total of two values.

The frequency of the above calibration values is 1kHz.

Warning:

AC current calibration, when the range is switched from 200mA to 2A, to ensure that the multimeter and personal safety, please promptly adjust the input terminal wiring.

8.5 Resistance calibration

Please refer to the resistance measurement for wiring, calibration steps refer to the DC voltage calibration.

Two ways to enter the resistance calibration:

1. In the resistance measurement function, press the + CAL AUTO key combination, and correctly enter the calibration password to enter the resistance calibration function. In this way, you can start calibration from any range or calibrate a particular range.
2. The resistance calibration function can also be entered via a specific remote command. In this way, calibration can only be started from the minimum range.

The calibration values that need to be entered for each range are shown below:

1. 200 Ω range need to enter 0 Ω, 100 Ω, 190Ω total of three values.
2. 2 kΩ range need to enter 0 kΩ, 1 kΩ, 1.9kΩ total of three values.
3. 20 kΩ range need to enter 0 kΩ, 10 kΩ, 19kΩ total of three values
4. 200 kΩ range need to enter 0 kΩ, 100 kΩ, 190kΩ total of three values
5. 2 MΩ range need to enter 0 MΩ, 1 MΩ, 1.9MΩ total of three values.
6. 20 MΩ range need to enter 0 MΩ, 10 MΩ, 19MΩ total of three values.
7. 200 MΩ range need to enter 0 MΩ, 100 MΩ, 200MΩ total of three values.

Note:

1) 2-wire resistance / 4-wire resistance are required to be calibrated.
2) The calibration procedure is carried out from low to high range.
3) When the calibration is completed and the next range is switched, the calibration data for that range has been saved and the calibration procedure can be exited at any time.

8.6 Capacitance calibration

Please refer to the capacitance measurement for wiring, calibration steps refer to the DC voltage calibration.

Two ways to enter the capacitance calibration:

1. In the capacitance measurement function, press the + CAL AUTO key combination, and correctly enter the calibration password to enter the capacitance calibration function. In this way, you can start calibration from any range or calibrate a particular range.
2. The capacitance calibration function can also be entered via a specific remote command. In this way, calibration can only be started from the minimum range.

The calibration values that need to be entered for each range are shown below:

1. 2 nF range need to enter 0 nF and 2 nF total of two values.
2. 20 nF range need to enter 0 nF and 20 nF total of two values.
3. 200 nF range need to enter 0 nF and 200 nF total of two values.
4. 2 μF range need to enter 0 μF and 2 μF total of two values.
5. 20 μF range need to enter 0 μF and 20 μF total of two values.
6. 200 μF range need to enter 0 μF and 200 μF total of two values.
7. 2 mF range need to enter 0 mF and 2 mF total of two values.
8. 10 mF range need to enter 0 mF and 10 mF total of two values.

9 Communication Interface

RS232 interface connection settings:

The multimeter can be connected to the computer via a male and female parallel serial cable.

RS232 interface baud rate, data bit, stop bit can be set as shown in Figure 9- 1.

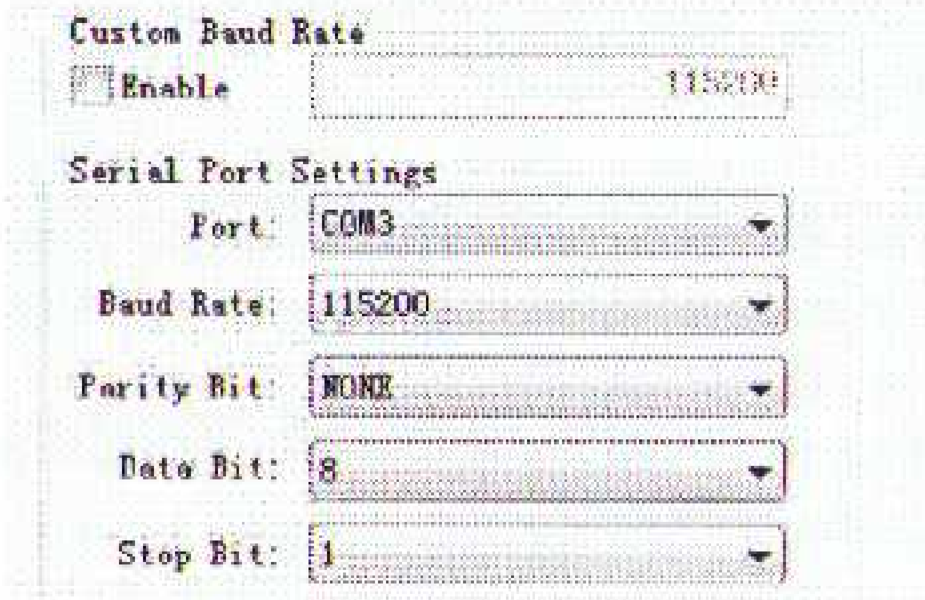


Figure 9- 1 Serial port configuration

USB Device interface

The multimeter can be connected to the computer via the USB cable.

Before using USB, install the USB-to-serial driver of STM32 on PC.

Please turn on the power before connecting the multimeter with the USB cable.

USB Host interface

USB Host interface can make the multimeter with U disk function. U disk can be used in the multimeter screenshots.

GPIB, LAN, WIFI, Buletooth can be used in multimeter communication with other devices, send the multimeter measurements to other devices.

10 Related software installation and use

(See the Operating Instructions in the software CD attached.)

11 Maintenance and upkeep

11.1 General maintenance and repair

Multimeter is a precision measuring instrument, please keep the instrument clean, tidy and gently.

About one year after the instrument is used, recalibrate the instrument to ensure that the indicators meet the requirements.

If the recalibration or repair of the instrument is needed, send it back to the manufacturer or dealer, and to have it repaired or calibrated by a qualified professional.

11.2 Replace the fuse

Fuse installation location can refer to the Figure 3- 4, one for the power fuse, one for the current fuse.

Fuse tube specifications:

0.5A L 250V fast-blow fuse, fuse specification is Φ5x20mm.

Steps:

Turn off the power and unplug the power cord.

Find the location of the fuse, remove the blown fuse according to the prompts on the instrument.

Replace the fuse, and install the new fuse.

Hangzhou Zhongchuang Electronics Co., Ltd.

Adress: NO. 3 Kangle Road, Gongshu District, Hangzhou   Postcode: 310015
Telephone: 0571-56861333   Fax: 0571-56861355
Website: http://www.cnheader.com   http://www.easttester.com
QQ: 2853705707, 2853705708